Visiting Professors

Visiting Professor
KATO, Masako *(from Hokkaido University)*

Construction of Photofunctional Metal Complexes and the Elucidation of Their Properties

In our research group, we focus on the creation of photofunctional metal complexes. **Fabrication of new multichromic materials:** Platinum(II) complexes exhibit characteristic luminescence by assembling. Taking advantage of the characteristic metallophilic interactions between Pt ions, our laboratory have developed new Pt(II) complexes with diimine or cyclometalating ligands exhibiting unique multichromic behaviors. **Fabrication of novel 3d-metal complexes with intense luminescence:** In order to effectively utilize elements, it is important that common metals should be used to fabricate materials with strong emissivity. We have developed various Cu(I) complexes exhibiting intense luminescence. **Fabrication of new photocatalysts based on redox-active organic ligands:** The strategy of our group to contribute to the energy issues is to construct novel photocatalytic systems using common metals instead of precious metals. By using a redox-active ligand, *o*-phenylenediamine, we found a simple metal-complex system for photochemical hydrogen evolution without extra photosensitizers.

Visiting Professor
YORIMITSU, Hideki *(from Kyoto University)*

Synthesis of π-Conjugated Molecules by Means of Organometallics

Porphyrins are an important class of compounds that occur in nature, playing the vital roles in biologically important phenomena such as oxygen transport, oxygen storage, and photosynthesis. Additionally, they constitute useful functional molecules in the field of advanced organic material sciences including organic photovoltaics. These important functions largely rely on their highly conjugated, 18π electronic, aromatic core. Peripheral functionalizations of the core have hence been attracting considerable attentions since they effectively alter the electronic and steric natures of the parent porphyrins to create new π-rich molecules and properties. Along this line, we have been interested in the following topics. 1) Catalytic selective direct arylation of porphyrin periphery, 2) Oxidative fusions of *meso*-(diarylamino)porphyrins and the properties of nanoazagraphene products, 3) Generation and reactions of porphyrinyl Grignard reagents, 4) Synthesis and properties of porphyrin oligomers.

Visiting Associate Professor
KAMIKUBO, Hironari *(from Nara Institute of Science and Technology)*

Development of an Auto-Sampling System Designed for Titration-SAXS Measurements

Various protein molecules concert with each other to express various biological functions. Because these multicomponent biological molecules weakly interact with each other, they can undergo regulatory dissociation and association upon inducing biological stimuli. In order to understand biological systems, we must, at first, aim to identify every possible unstable complex involved in the given multicomponent system, and then quantitatively analyze the interactions of these complex molecules. However, because of the complexity, it is generally difficult to apply conventional analytical methods to analyze such multi-component equilibrium systems. We have realized a new analytical method that would enable us to perform structure and interaction analyses on multi-component equilibrium systems. This was achieved by developing an auto-sampling system equipped with micro-fluidics technology. Applying this newly designed equipment to SAXS measurements, we can automatically collect numerous scattering profiles while altering the molar ratios of each component involved in the multi-component equilibrium; thus, enabling us to determine the system's free energy landscape of the multi-component equilibrium.